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OF PENNSYLVANIA IN 1983

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THE MINERAL INDUSTRY OF PENNSYLVANIA IN 1983

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DEPARTMENT OF ENVIRONMENTAL RESOURCES
OFFICE OF RESOURCES MANAGEMENT
BUREAU OF
TOPOGRAPHIC AND GEOLOGIC SURVEY
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The Mineral Industry of Pennsylvania

This chapter has been prepared under a Memorandum of Understanding between the Bureau of Mines, U.S. Department of the Interior, and the Pennsylvania Bureau of Topographic and Geologic Survey, Department of Environmental Resources, for collecting information on all nonfuel minerals.

By L. J. Prosser,[1] Arthur A. Socolow,[2] and Robert C. Smith[3]

The value of nonfuel mineral production in Pennsylvania in 1983 was $635.1 million, an increase of $32.5 million over that of 1982. Nationally, the State ranked 10th in value of nonfuel mineral production, accounting for about 3% of the U.S. total value of output.

Cement was again the State's leading nonfuel mineral commodity accounting for about 37% of the value of Pennsylvania's mineral production. Nationally in 1983, the State ranked third in portland cement shipments and fourth in masonry cement shipments.

Output of the State's second leading mineral commodity, crushed stone, increased for the first time in 4 years. Although the State ranked third nationally in output, production has declined nearly 20 million tons since 1979 when 71.4 million tons was produced.

Other commodities produced in Pennsylvania included clays, lime, mica, peat, sand and gravel, and dimension stone.

Table 1.—Nonfuel mineral production in Pennsylvania[1]

Mineral	1982 Quantity	1982 Value (thousands)	1983 Quantity	1983 Value (thousands)
Cement:				
Masonry thousand short tons	256	$14,048	262	$17,095
Portland do	4,800	212,945	5,154	218,539
Clays[2] do	931	5,616	916	4,311
Gem stones	NA	5	NA	5
Lime thousand short tons	1,297	70,902	1,507	81,682
Peat do	27	669	22	628
Sand and gravel:				
Construction do	13,081	55,527	e11,800	e52,000
Industrial do	969	13,589	W	W
Stone:				
Crushed do	e50,400	e200,900	51,523	226,948
Dimension do	e48	e6,354	53	5,799
Zinc (recoverable content of ores, etc.) metric tons	24,762	21,001	16,792	15,322
Combined value of clays (kaolin), mica (scrap), tripoli (1982), and value indicated by symbol W	XX	r1,094	XX	12,812
Total	XX	r602,650	XX	635,141

eEstimated. rRevised. NA Not available. W Withheld to avoid disclosing company proprietary data; value included with "Combined value" figure. XX Not applicable.

[1]Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

[2]Excludes kaolin; value included with "Combined value" figure.

Table 2.—Value of nonfuel mineral production in Pennsylvania, by county[1]

(Thousands)

County	1981	1982	Minerals produced in 1982 in order of value
Adams	W	$9,747	Lime, clays, mica.
Allegheny	W	17,377	Cement, clays, sand (industrial).
Armstrong	$1,674	W	Sand and gravel (construction), clays, sand (industrial).
Beaver	W	9,189	Sand and gravel (construction).
Bedford	W	(2)	
Berks	W	W	Cement, clays.
Blair	7,670	(2)	
Bradford	(3)	921	Sand and gravel (construction).
Bucks	W	W	Sand and gravel (construction), clays.
Butler	W	17,140	Lime, cement, sand and gravel (construction).
Cameron	(3)	W	Sand and gravel (construction).
Carbon	W	912	Do.
Centre	W	18,672	Lime.
Chester	W	W	Lime, clays.
Clarion	(2)	--	
Clearfield	336	W	Clays.
Clinton	W	536	Do.
Columbia	W	W	Sand and gravel (construction).
Crawford	(3)	1,094	Do.
Cumberland	4,435	923	Do.
Dauphin	3,174	W	Do.
Delaware	W	(2)	
Elk	103	(2)	
Erie	61	4,096	Sand and gravel (construction), peat.
Fayette	W	--	
Forest	(3)	W	Sand and gravel (construction).
Franklin	W	W	Do.
Fulton	W	W	Do.
Huntingdon	W	W	Sand (industrial).
Jefferson	W	W	Clays, sand and gravel (construction).
Juniata	366	(2)	
Lackawanna	W	W	Peat.
Lancaster	W	973	Clays.
Lawrence	W	24,418	Cement, sand and gravel (construction), clays, peat.
Lebanon	W	W	Lime.
Lehigh	W	W	Cement, zinc.
Luzerne	1,067	W	Sand and gravel (construction), peat, sand (industrial).
Lycoming	W	W	Sand and gravel (construction).
McKean	W	W	Clays.
Mercer	W	2,106	Sand and gravel (construction).
Mifflin	W	W	Sand and gravel (construction), lime.
Monroe	W	1,115	Sand and gravel (construction), clays, peat.
Montgomery	W	W	Lime.
Montour	W	(2)	
Northampton	W	113,301	Cement, sand and gravel (construction), clays.
Northumberland	W	907	Sand and gravel (construction), clays, tripoli.
Perry	W	(2)	
Philadelphia	(3)	--	
Pike	377	101	Sand and gravel (construction).
Potter	W	(2)	
Schuylkill	1,002	W	Sand and gravel (construction).
Snyder	W	(2)	
Somerset	3,207	1,778	Clays.
Susquehanna	1,254	W	Sand and gravel (construction).
Tioga	W	W	Do.
Union	W	65	Clays.
Venango	W	W	Sand and gravel (construction), sand (industrial).
Warren	(3)	2,499	Sand and gravel (construction).
Wayne	671	W	Do.
Westmoreland	9,934	W	Do.
Wyoming	(3)	W	Do.
York	45,848	14,604	Lime, cement, clays, sand and gravel (construction).
Undistributed[4]	496,476	152,924	
Sand and gravel (construction)	e61,100	XX	
Stone:			
Crushed	XX	e200,900	
Dimension	XX	e6,354	
Total[5]	638,756	602,650	

eEstimated. W Withheld to avoid disclosing company proprietary data; included with "Undistributed." XX Not applicable.

[1]Cambria, Greene, Indiana, Sullivan, and Washington Counties are not listed because no nonfuel mineral production was reported. County distribution for construction sand and gravel (1981) and crushed and dimension stone (1982) is not available; total State values shown separately under "Sand and gravel (construction)" or "Stone."

[2]Stone, either crushed or dimension, was produced; data not available by county.

[3]Construction sand and gravel was produced; data not available by county.

[4]Includes gem stones that cannot be assigned to specific counties and values indicated by symbol W.

[5]Data do not add to totals shown because of independent rounding.

Table 3.—Indicators of Pennsylvania business activity

		1982	1983[p]	Change, percent
Employment and labor force, annual average:				
Total civilian labor force	thousands	5,381.2	5,383.5	--
Unemployment	do	760.3	542.3	-28.7
Employment (nonagricultural):				
Mining[1]	do	35.8	39.4	+10.1
Manufacturing	do	1,071.2	1,107.3	+3.4
Contract construction	do	137.7	144.3	+4.8
Transportation and public utilities	do	236.8	243.0	+2.6
Wholesale and retail trade	do	947.7	1,002.8	+5.8
Finance, insurance, real estate	do	237.3	245.1	+3.3
Services	do	1,042.9	1,056.3	+1.3
Government	do	679.9	659.2	-3.0
Total nonagricultural employment[1]	do	4,389.3	4,497.4	+2.5
Personal income:				
Total	millions	$129,956	$136,912	+5.4
Per capita		$10,934	$11,510	+5.3
Construction activity:				
Number of private and public residential units authorized		22,271	34,403	+54.5
Value of nonresidential construction	millions	$1,560.2	$1,685.2	+8.0
Value of State road contract awards	do	$275.0	$298.0	+8.4
Shipments of portland and masonry cement to and within the State	thousand short tons	2,310	2,417	+4.6
Nonfuel mineral production value:				
Total crude mineral value	millions	$602.6	$635.1	+5.4
Value per capita, resident population		$51	$53	+3.9
Value per square mile		$13,292	$14,018	+5.5

[p]Preliminary.
[1]Includes coal (anthracite and bituminous), gas, and oil extraction.

Sources: U.S. Department of Commerce, U.S. Department of Labor, Highway and Heavy Construction Magazine, and U.S. Bureau of Mines.

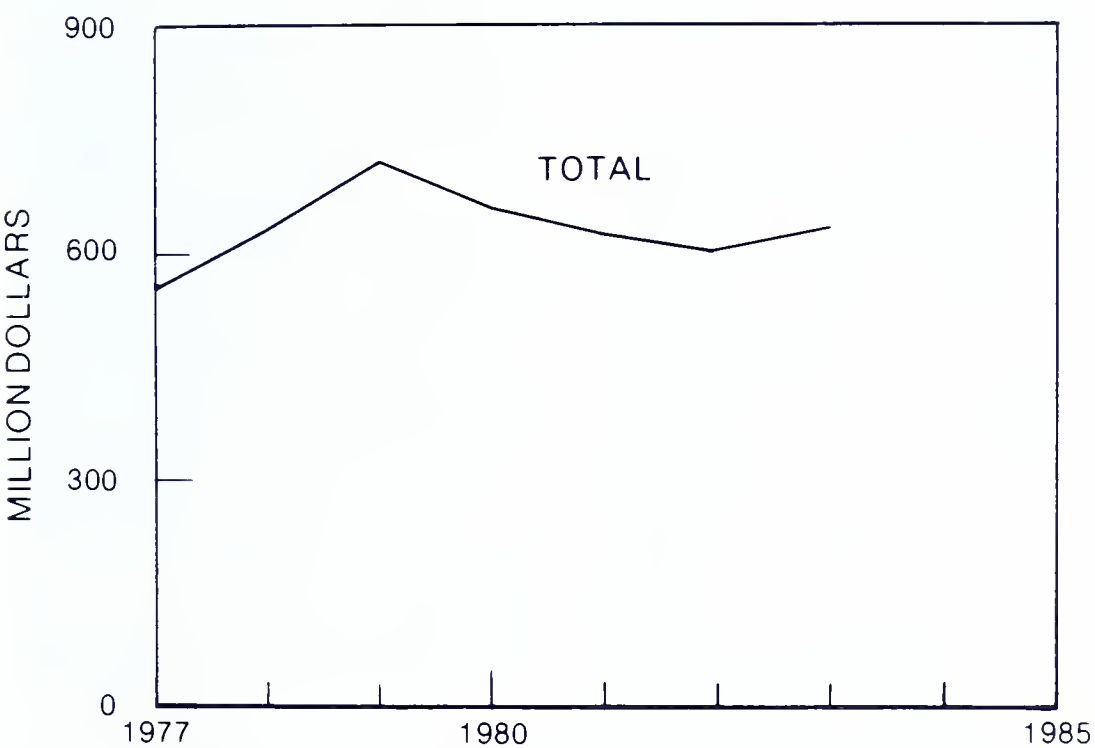

Figure 1.—Total value of nonfuel mineral production in Pennsylvania.

Pennsylvania's last metal mine closed in October, ending a 250-year history of metallic mineral production in the State. New Jersey Zinc Co., a subsidiary of Gulf + Western Industries Inc., shut down its underground zinc mine at Friedensville, Lehigh County, and allowed the mine to flood. Although substantial reserves reportedly remain, the high cost of production and a decline in demand for zinc forced the closure. Late in the year, it was reported that the entire property was sold to a developer.

Trends and Developments.—In 1983, Pennsylvania's nonfuel mineral industry moderately joined in the recovery from the 1981-82 recession. The State's construction sector rebounded in 1983 but at a level below the national average. The value of contract construction awards in Pennsylvania in 1983 surpassed the 1982 mark by 7.7%; nationally, the value increased by 23.4%. Pennsylvania's output of mineral commodities used primarily in construction also lagged behind national rates.

Commodity	Percent change 1982-83	
	United States	Pennsylvania
Cement	+10	+7
Clays	+15	-2
Sand and gravel (construction)	+10	-10
Stone (crushed)	+9	+2

Pennsylvania's manufacturing sector continued to decline in 1983 as average monthly employment in the State's manufacturing industries dropped 6%, while nationally the drop was less than 1% for these industries. The State's primary metals industries accounted for only 2.7% of all nonagricultural employment in 1983, and the average level of employment declined 13.4% compared with that of 1982. The slackened pace of recovery in Pennsylvania's manufacturing sector reflected the State's decline in heavy manufacturing industries, particularly in steel. Prior to 1982, Pennsylvania led the United States in steel production. Since then, both Indiana and Ohio surpassed the State in steel output accounting for 24.2% and 17.5% of the U.S. total, respectively, compared with Pennsylvania's 15.6%.[4] Expected to add to the State's declining position in steel was a December announcement by United States Steel Corp. (USS) that a major restructuring, eliminating about 11,100 jobs in basic steel, was scheduled for April 1984. The announcement listed operations at 6 steel plants in Pennsylvania, affecting about 3,800 workers.

Legislation and Government Programs.—In 1983, the General Assembly of Pennsylvania introduced House bill No. 1176, the Noncoal Surface Mining Conservation and Reclamation Act. The bill would provide a separate law for the State's noncoal mining industry. Since 1972, all mining activities in Pennsylvania were included in a single surface mining law. In 1977, passage of the Federal Surface Mining Law added amendments to the 1972 laws to incorporate mandated Federal requirements. These amendments, according to sponsors of the legislation, imposed requirements, penalties, and economic burdens not appropriate or necessary for the noncoal industry.

Other legislative and regulatory actions under consideration during the year included a bill prohibiting the Department of Environmental Resources (DER) from issuing any permit pertaining to mining, water quality, air quality, solid waste, and other areas unless an on-site inspection is first conducted. In addition, no type of interim or temporary permit could be issued if a project was started without the permission or knowledge of the DER.

Regulatory initiatives under consideration included establishing procedures that allow companies to determine the most effective manner of complying with State air pollution control requirements. The proposed rules would allow Pennsylvania's industries to reduce the cost of complying with air pollution control requirements. Another proposed rule change would limit the water pollution liability for an operator resuming mining at an abandoned minesite. The regulation would limit an operator's liability to meeting the water effluent standards existing at the abandoned site.

Late in the year, the Allegheny County controller filed the first petition under the Pennsylvania Trade Practices Act of 1968 claiming that five foreign countries were engaged in unfair trade practices. The petition, if upheld, would ban the use of steel products from Argentina, Brazil, Mexico, the Republic of Korea, and Spain on government financed or public and private assisted projects in the State. Government agencies in Pennsylvania reportedly purchase an estimated $330 million in steel products per year for highways, bridges, and other construction projects.

The Pennsylvania Topographic and Geologic Survey completed a number of projects including statewide reconnaissance surveys of potential carbonate whiting sources and high-purity silica deposits, reports on white refractory clay deposits and fetid barite

occurrences in Berks County, a summary of the State's slate mining industry, a new "Stratigraphic Correlation Chart of Pennsylvania" for use in understanding nomenclature and in correlating various potential mining intervals, and a publication on the geology and mineralogy of copper-uranium occurrences in the Picture Rocks and Sonestown 7-1/2-minute quadrangles.[5]

Also during the year, The Pennsylvania State University and West Virginia University were jointly named the newest Generic Center for Mineral Technology under the act that established the Mineral Resources Institute Program. The two universities received $1.8 million from the U.S. Bureau of Mines to establish research facilities to investigate black lung disease as well as other respirable dust diseases associated with mining.

Also, in conjunction with the Mineral Resources Institute Program, Penn State completed a handbook outlining procedures for conducting an economic analysis of the effects of proposed new taxes on the mining industry. The publication also provides a summary of State mineral tax laws.[6]

REVIEW BY NONFUEL MINERAL COMMODITIES

In this section, commodities that were mined, processed, or manufactured in Pennsylvania in 1983 are discussed and highlighted. Quantity and value data for mined commodities are given in table 1. Traditionally, cement and lime data are also presented in table 1. The combined value of commodities that were processed or manufactured in Pennsylvania in 1983 was $1.7 billion. These commodities are abrasives, graphite, gypsum, iron and steel slag, perlite, pyrophyllite, sulfur, sulfuric acid, tripoli, vermiculite, ferroalloys, iron oxide pigments, and pig iron. The value of pig iron shipments accounted for 90% of the total. Beryllium and titanium processing operations are also discussed, but no production or value data are available.

NONMETALS

Abrasives.—Three types of abrasive materials—metallic, artificial crude, and tripoli—were produced in Pennsylvania in 1983. Metallic abrasives, steel shot and grit, were manufactured at three plants by three companies in western Pennsylvania. Nationally, the State accounted for 38% of the total metallic abrasives sold or used and was one of only four States that produced this material.

Silicon carbide, classified as a crude artificial abrasive, was manufactured by one firm in southwestern Pennsylvania. The firm was one of only seven that produced silicon carbide in the United States and Canada. Tripoli was purchased by one firm in east-central Pennsylvania and processed for sale as a filler.

Cement.—Pennsylvania's cement industry rebounded in 1983 with a 7% increase in shipments compared with that of 1982. Pennsylvania ranked third nationally in portland cement shipments and fourth in masonry cement shipments. In the past 5 years, the State annually accounted for about 8% of the domestic cement production. Although portland cement production in the State increased in 1983 for the first time in 5 years, shipments remained considerably below the record high of 6.75 million tons shipped in 1978. Grinding capacity also decreased from 9.7 million tons in 1978 to 7.3 million tons in 1983.

Cement data for Pennsylvania is divided into two districts: Eastern Pennsylvania, which is all counties east of the eastern boundaries of Porter, Clinton, Centre, Huntingdon, and Franklin Counties; and western Pennsylvania, which is all other counties in the State. In 1983, the State's eight eastern plants produced 4.1 million tons of portland cement utilizing about 85% of capacity. The State's four western plants produced about 1 million tons of portland cement utilizing about 41% of capacity.

Developments in Pennsylvania's cement industry in 1983 included Keystone Portland Cement Co., Bath, purchasing stone crushing equipment for $1 million for the production of aggregate from low-calcium stone overburden. Previously, overburden at the company's quarry was removed by a contractor. The firm also began marketing cement kiln dust for use in converting aqueous liquid waste into solid waste. As a result, Keystone reported a $200,000 profit from kiln dust sales; previously, disposal of the cement dust cost the firm about $35,000 annually.

Armstrong Cement & Supply Corp., Cabot, formerly Penn-West Cement Co. Inc., began a $3.5 million capital improvement plan. Louisville Cement Co. sold its Bessemer cement plant to SME Bessemer Cement

Co., a subsidiary of Standard Machine & Equipment Co.

Clays.—Production decreased for the fifth consecutive year and was about 1.7 million tons below the 1978 output of 2.6 million tons. In that time period, over one-half of the decline in production resulted from the drop in clays sold or used for face and common brick from about 1.5 million tons to about 771,000 tons. Usage by the clay industry's major consumer, the home construction industry, also declined significantly since 1978 when 54,000 units were started compared with about 22,300 units in 1982 and 34,400 units in 1983.

Table 4.—Pennsylvania: Clays[1] sold or used by producers, by use

(Short tons)

Use	1982	1983
Common brick	33,341	47,002
Face brick	630,530	723,576
Firebrick, block and shapes	115,217	24,373
Flue linings	19,291	22,631
Mortar and cement, refractory	14,493	10,993
Portland and other cements	81,727	51,429
Tile: Drain, quarry, structural	32,034	31,929
Other[2]	4,031	4,031
Exports: Mortar, cement, other refractories	260	260
Total	930,924	916,224

[1]Excludes kaolin.
[2]Includes paint, highway surfacing, and structural concrete.

In 1983, common clay was produced by 20 companies at 37 mines, a decrease of 2 companies and 17 mines, respectively, compared with figures in 1982. Leading production areas included parts of Berks, Jefferson, and York Counties.

Gem Stones.—Mineral specimens and semiprecious gem stones were collected by rockhounds and mineral dealers. Estimated value in Pennsylvania in 1983 was $5,000.

Graphite (Manufactured).—Pennsylvania ranked seventh among the 15 States that manufactured graphite. Production declined about 25% compared with that of 1982. Most of the output was sold as unmachined graphite shapes.

Gypsum (Calcined).—Output in Pennsylvania resumed, reflecting improved conditions primarily in the home repair and rehabilitation markets. Strong demand for wallboard enabled United States Gypsum Co. to reopen its Philadelphia calcining plant during the third quarter of the year. The plant had been closed for more than a year during the recession. The Philadelphia operation was the only gypsum calcining plant active in Pennsylvania during the year.

Lime.—Output in 1983 increased to 1.5 million tons; in 1982, output of about 1.3 million tons was the lowest since 1963. Although demand for lime improved in 1983, production remained well below the levels reported in the late 1970's of more than 2 million tons per year in 1977, 1978, and 1979. The decline in the level of lime production reflects the decreased output of the State's steel industry. In 1983, lime sold or used by Pennsylvania producers and consumed by the steel industry declined more than 500,000 tons compared with 1978 data. Also, of the total lime manufactured in Pennsylvania, 60% was consumed by the steel industry in 1978; steel industry consumption dropped to 50% in 1983.

Most of Pennsylvania's lime was manufactured in the southeastern part of the State in Adams, Chester, Lebanon, Montgomery, and York Counties. Other counties in which lime was produced were Butler in western Pennsylvania and Centre in the central part of the State.

In Centre County, the Domtar Industries Inc.'s underground limestone mine and lime manufacturing plant that were closed in June 1982 were sold to a local investor and renamed Con Lime Inc. Lime production at the 160,000-ton-per-year-capacity plant resumed in May with one of three kilns in operation.

Table 5.—Pennsylvania: Lime sold or used by producers, by use

Use	1982		1983	
	Quantity (short tons)	Value (thousands)	Quantity (short tons)	Value (thousands)
Steel, basic oxygen furnace	454,056	$23,207	492,517	$24,350
Steel, electric	178,557	9,068	223,111	11,085
Sewage treatment	153,821	8,248	153,594	8,267
Acid water neutralization (mine or plant)	65,642	3,729	93,681	5,130
Water purification	104,468	5,685	84,576	4,694
Steel, open-hearth	39,462	1,997	39,439	1,955
Mason's lime	49,329	3,716	W	W
Paper and pulp	18,123	880	21,388	1,020
Agriculture	12,837	782	18,907	1,230
Brick, sand-lime	3,517	215	W	W
Petroleum refining	2,481	137	W	W
Metallurgy, other	1,571	80	1,415	W
Other[1]	213,289	13,158	378,130	23,951
Total	1,297,153	70,902	1,506,758	81,682

W Withheld to avoid disclosing company proprietary data; included with "Other."
[1]Includes alkalies, glass, oil well drilling, ore concentration, other chemical and industrial uses, paint, petrochemicals (1982), refractories, rubber, silica brick, soil stabilization, sulfur removal from stack gases, tanning, wire drawing, and uses indicated by symbol W.

Mica.—Gross Minerals Corp. mines crude mica (sericite) at an open pit mine in Fairfield about 20 miles from the company's plant in Aspers, Adams County. The deposit is reportedly one of the few in the United States of pure sericite, and ore reserves are estimated at 5 to 7 million short tons. After mining, the material is rotary dried and processed by ball mill and air classification to the micrometer-size range. The material is marketed as a filler and extender.

Peat.—Sales declined more than 5,000 tons in 1983, or nearly 20%, compared with that of 1982. The unit price of peat increased $3.78 to $28.55 per ton with the value of sales declining 6%. Nationally, peat sold for an average price of $25.75 per ton.

Peat mining in Pennsylvania in 1983 was concentrated in two areas. Of the State's seven permitted operations, five were in a three-county area in northeastern Pennsylvania; the other two were on the western border in the northern and central part of the State. The nearest eastern and western peat bogs were separated by about 250 miles. About 75% of the peat was sold in bulk; the other 25% was packaged.

During the year, Anderson Peat Co. in Monroe County was renamed Hyponex Corp. Fehlingers Peat Moss Co., a small producer in 1982 in Luzerne County, was inactive in 1983.

Perlite (Expanded).—Crude perlite mined in New Mexico and shipped to Pennsylvania was expanded by five companies at five plants. Nationally, the State ranked fourth in the quantity of perlite expanded, accounting for about 8% of the U.S. total. In 1983, production declined 7,000 short tons to 31,700 tons valued at about $5 million. U.S. Gypsum discontinued perlite expanding operations at its Philadelphia County plant, although gypsum calcining resumed during the year.

Pyrophyllite.—American Olean Tile Co. imported crude pyrophyllite from its Canadian mine for processing at Lansdale, Montgomery County. The amount of imported ore ground increased nearly 50% compared with that of 1982. The ground pyrophyllite was used in the manufacture of ceramic products including wall and floor tile. The operation employed about 1,300 workers.

Quartz Crystal (Cultured).—Bliley Electric Co., Erie, and Motorola Inc. and P. R. Hoffman Co., Carlisle, were three of the seven companies in the United States that produced cultured quartz crystal in 1983. The firms used lascas, a nonelectronic-grade quartz, as feedstock for growing cultured quartz crystal. Also, a number of Pennsylvania companies consumed cultured quartz to manufacture piezoelectric products, including filters, oscillators, and signal processors, which are used in a variety of military and civilian electronic applications.

Sand and Gravel.—*Construction.*—Construction sand and gravel production is surveyed by the U.S. Bureau of Mines for even-numbered years only; therefore, this chapter contains only estimates for 1983. The data for odd-numbered years are based on annual company estimates made before yearend.

Based on the estimates for 1983 construction sand and gravel, production dropped

for the fourth consecutive year. The 1983 output of 11.8 million tons was about 1.3 million tons lower than that of 1982 and about 7.2 million tons below the 1979 total.

Traditionally, construction sand and gravel is mined in about one-half of the State's 67 counties, primarily northwest and east of the Appalachian Mountains. Leading counties in production in western Pennsylvania are Armstrong, Beaver, and Erie; in the east, Bucks, Columbia, and Lycoming. Little or no sand and gravel is produced in the area of the State's highly populated cities of Pittsburgh and Philadelphia. Environmental constraints have curtailed dredged river sand and gravel production in western Pennsylvania; only two dredging operations remain on the Allegheny River.

Industrial.—Industrial sand output dropped in 1983 reflecting the increased use of plastic containers instead of glass products.

Table 6.—Pennsylvania: Sand and gravel sold or used by producers

	1982			1983		
	Quantity (thousand short tons)	Value (thousands)	Value per ton	Quantity (thousand short tons)	Value (thousands)	Value per ton
Construction:						
Sand	5,044	$22,989	$4.56	NA	NA	NA
Gravel	7,189	30,402	4.23	NA	NA	NA
Sand and gravel (unprocessed)	849	2,136	2.52	NA	NA	NA
Total or average	[1]13,081	55,527	4.24	[e]11,800	[e]$52,000	[e]$4.41
Industrial sand	969	13,589	14.02	W	W	14.32
Grand total or average	14,050	69,116	4.92	W	W	W

[e]Estimated. NA Not available. W Withheld to avoid disclosing company proprietary data.
[1]Data do not add to total shown because of independent rounding.

Slag, Iron and Steel.—Nationally, Pennsylvania ranked first in sales of processed iron and steel slag in 1983. Both the quantity and value of slag sales declined by about 10% compared with those in 1982. Of the 3.9 million short tons of slag produced, 81% was iron slag and 19% was steel slag.

Three types of iron slag were processed by a total of 12 companies: air-cooled, used for asphalt, concrete aggregate, and as a road base material; expanded, used as lightweight aggregate; and granulated, used for road base material. Steel slag, processed at 10 operations, was used primarily for road base material.

Stone.—Stone production is surveyed by the U.S. Bureau of Mines for odd-numbered years only; the 1982 chapter gave estimates. Data for even-numbered years are based on annual company estimates made before yearend.

Crushed.—Output of the State's second leading mineral commodity, crushed stone, increased for the first time in 4 years. Although the State ranked third nationally in output, production has declined nearly 20 million tons since 1979 when 71.4 million tons was produced. The decreased level of crushed stone production reflects the reduced demand from the State's steel and construction industries.

In 1983, about 80% of the stone mined in Pennsylvania was limestone and dolomite. Other types of stone mined were granite, marble, sandstone, and traprock. About 14% of the stone was used for unpaved road surfacing. The second largest use of crushed rock was for graded road base or subbase at about 13% with the third largest quantity of about 11% used in cement manufacture. Other leading uses listed in decreasing order of quantity included bituminous aggregate (coarse), concrete aggregate (coarse), and fine aggregate.

Of the State's 67 counties, 50 reported production in 1983, and output exceeded 1 million tons in 17 counties. Nearly 70% of the State's crushed stone production was concentrated in a 13-county area in southeastern Pennsylvania. Output from these 13 counties ranged from 1.1 million tons in Cumberland County to 4.6 million tons in Montgomery County. The four other counties with production of more than 1 million tons were Fayette and Westmoreland Counties in southwestern Pennsylvania and Blair and Centre Counties in central Pennsylvania.

The State's top five producers were New

Enterprise Stone & Lime Co. Inc., Koppers Co., Bethlehem Steel Corp., Warner Co., and Stabler Co. Inc., accounting for about one-third of the total output. A total of 9 of the State's 183 quarries produced more than 1 million tons, accounting for 25% of the total crushed stone output.

Developments in the State's crushed stone industry included the opening of a quarry by the Standard Slag Co. in Windber, Somerset County. Previously, the company sold slag obtained from Bethlehem Steel in Johnstown, but increased use of electric furnaces resulted in Standard developing a new source of aggregate material. Late in the year, Silver Ford Inc., a unit of J. M. Brenner Co., announced plans to open a limestone quarry in southeastern Pennsylvania. The company was proceeding in filing development plans with the State's DER.

Two quarry developments were faced with local public opposition and remained pending at yearend. Hempt Bros. Inc. continued to seek township approval to open a limestone quarry with a production capacity of 400,000 tons per year in Cumberland County. Residents opposed the plan claiming the quarry would cause noise problems and blasting damage to their homes. Hempt Bros., which owns the land, sought the approval to replace its existing quarry, which is near depletion. Warner Co., Berks County, also faced local objections to its plan to expand stockpile areas. A decision by the State's DER on variances to extend the stockpiles was expected in 1984.

Table 7.—Pennsylvania: Crushed stone[1] sold or used by producers in 1983, by use

(Thousand short tons and thousand dollars)

Use	Quantity	Value
Coarse aggregate (+1-1/2 inch):		
Macadam	302	1,119
Riprap and jetty stone	252	1,133
Filter stone	182	722
Coarse aggregate, graded:		
Concrete aggregate, coarse	3,512	14,527
Bituminous aggregate, coarse	3,607	15,145
Bituminous surface treatment aggregate	1,626	6,509
Railroad ballast	1,152	4,216
Fine aggregate (-3/8 inch):		
Stone sand, concrete	837	3,609
Stone sand, bituminous mix or seal	1,223	6,364
Screening, undesignated	803	3,011
Other fine aggregate	3,380	16,164
Coarse and fine aggregate:		
Graded road base or subbase	6,697	25,241
Unpaved road surfacing	7,004	25,781
Crusher run or fill or waste	1,454	5,296
Other construction materials	49	192
Agricultural:		
Agricultural limestone	1,738	13,649
Poultry grit and mineral food	61	780
Other agricultural uses	30	135
Chemical and metallurgical:		
Cement manufacture	5,880	20,529
Lime manufacture	2,199	12,734
Flux stone	1,450	8,757
Glass manufacture	43	502
Special:		
Mine dusting or acid water treatment	124	2,324
Asphalt fillers or extenders	156	1,663
Other fillers or extenders	348	5,310
Other[2]	7,412	31,538
Total[3]	51,523	226,948

[1]Includes limestone, dolomite, granite, marble, sandstone, traprock, and miscellaneous stone.

[2]Includes terrazzo and exposed aggregate, dead-burned dolomite, chemical stone for alkali works, whiting or whiting substitute, paper manufacture, roofing granules, sulfur oxide removal, coarse aggregate (large), coarse aggregate (graded), combined coarse and fine aggregate, and other uses not specified.

[3]Data do not add to totals shown because of independent rounding.

Dimension.—In 1983, 13 companies produced dimension stone at 16 quarries. Bucks, Chester, and Northampton were the leading counties in production. Of the total output of 53,400 tons (753,000 cubic feet), about two-thirds was sandstone. Other major types of dimension stone quarried were slate and granite (diabase). Leading uses were for irregular-shaped stone, flagging, cut stone, and roofing slate.

Table 8.—Pennsylvania: Dimension stone[1] sold or used by producers in 1983, by use

Use	Quantity (short tons)	Cubic feet (thousands)	Value (thousands)
Rough stone:			
Rough blocks for building and construction	8,107	105	$420
Irregular-shaped stone	20,549	251	1,438
Monumental	1,229	12	229
Dressed stone:			
Flagging	5,036	138	346
Flooring slate	117	2	32
Other[2]	18,362	246	3,334
Total	53,400	[3]753	5,799

[1]Includes granite, sandstone, slate, and miscellaneous stone.
[2]Includes ashlars and partially squared pieces, roofing slate, structural and sanitary, blackboards, and uses not specified.
[3]Data do not add to total shown because of independent rounding.

Sulfur (Recovered).—Shipments of recovered elemental sulfur in Pennsylvania amounted to 53,000 metric tons valued at about $4.5 million, a decrease of about 7% in both quantity and value compared with 1982 totals. Sulfur was used in the manufacture of sulfuric acid, for leaching ores, and in chemicals, fibers, paints, and explosives.

In 1983, three petroleum refineries, two in Philadelphia County and one in Delaware County, recovered sulfur from desulfurization of refinery gases and treatment of natural gas. One steel company in Allegheny County recovered byproduct sulfur from coke production.

Vermiculite (Exfoliated).—Two companies—A-Tops Corp./J. P. Austin Associates, Beaver County, and W. R. Grace & Co., Lawrence County—exfoliated vermiculite shipped to Pennsylvania from Montana. The material was packaged and sold for use as a lightweight concrete aggregate, loose-fill insulation, block insulation, and a fireproofing agent.

METALS

Beryllium.—The Cabot Berylco Div. of the Cabot Corp. produced beryllium-copper and beryllium alloys at its plant in Reading. Also in Reading, Brush-Wellman Inc. operated a beryllium-copper strip manufacturing facility. Copper-based beryllium alloys are used primarily by the aircraft, automotive, electronic, and well-drilling industries.

Ferroalloys.—Shipments of ferroalloys in Pennsylvania in 1983 increased to 5,381 short tons from 4,029 tons in 1982; however, value declined from about $29.7 million to about $26.6 million. The decline in value reflected the continuing strong competition from imports. As recently as 1980, shipments totaled about 6,800 tons valued at $92.6 million.

Climax Molybdenum Co., a division of AMAX Inc., suspended operations in January at its Langeloth molybdenum oxide concentrate conversion plant because of continued poor demand. In May, the firm recalled about 25 of the 190 employees in the work force to resume limited production from existing stocks. Limited production continued through yearend at the 140,000-pound-per-day-capacity plant as AMAX's molybdenum mines in Colorado remained closed throughout 1983.

In February, three creditors of The Pesses Co., Pulaski, Lawrence County, filed a petition for involuntary liquidation of the firm under Chapter 7 of the Federal Bankruptcy Code.

Iron Oxide Pigments.—In 1983, finished iron oxide pigment shipments from Pennsylvania producers totaled about 29,000 tons valued at $32.7 million. Shipments of regenerator oxides totaled about 4,900 short tons valued at about $318,000.

Iron and Steel.—Pennsylvania ranked third of 13 States in shipments of pig iron in 1983. Shipments totaled 7.1 million short tons valued at about $1.5 billion. Pig iron shipments increased nearly 30% in 1983 compared with the 1982 level; however, shipments were about 52% below the 1981 total.

Table 9.—Pennsylvania: Pig iron shipments

Year	Pig iron shipments			Rank in United States
	Thousand short tons		Percent	
	Pennsylvania	U.S. total		
1979	19,079	88,781	21.5	1
1980	15,245	69,445	22.0	2
1981	14,804	74,218	20.0	2
1982	5,491	43,449	12.6	3
1983	7,110	49,081	14.5	3

Steel production in Pennsylvania also increased in 1983 to 10.7 million short tons from 9.1 million tons in 1982. Pennsylvania accounted for 15.6% of the total U.S. production in 1983, an increase from 14.9% in 1982 but significantly below the more than 20% share prevailing before the recession.

The decline in the State's steel industry reflects increased foreign competition, which has benefited from declining shipping costs and higher U.S. labor costs. Also, expanding exploration that led to development of raw materials in other parts of the world and changing technologies in steelmaking have resulted in less reliance on Pennsylvania iron ore and coal deposits that initially gave the State a dominant position in the steel industry.[7]

Developments during the year included the announcement by USS, the Nation's leading steel producer, of a major restructuring that eliminates about 11,100 jobs in basic steel, of which 3,800 Pennsylvania workers were affected. The restructuring was scheduled to begin in April 1984. Of the 3,800 Pennsylvania workers affected by the announcement, about 1,200 were working and 2,600 were on layoff. Operations scheduled for permanent closure in Pennsylvania were fabrication plants in Pittsburgh and Ambridge and specialty steel operations in Johnstown. Plants listed for partial closings included the Fairless Works near Philadelphia; the Clairton, Duquesne, Edgar Thomson, Homestead, National, and Irvin-Vandergrift plants, all near Pittsburgh.

In that same announcement, USS canceled previous plans to import steel slabs from the British Steel Corp. for processing at the firm's Fairless Works. USS also suspended plans to build a 1.3-million-ton continuous slab caster at its Edgar Thomson plant. The facility, in the planning stage since 1980, would have supplied steel slabs for conversion into sheet and tin products at the firm's Irvin-Vandergrift plant.

Also in 1983, the Environmental Protection Agency gave USS a 3-year extension for compliance with air pollution control standards. The settlement was based on the Steel Industry Compliance Extension Act of 1981, an amendment to the Clean Air Act. The agreement to extend the deadline for compliance also required a modernization program for the Homestead Works near Pittsburgh.

Bethlehem Steel, the second largest steel producer in the United States, operated three steel plants in Pennsylvania at Bethlehem, Johnstown, and Steelton. In August, Bethlehem Steel restarted electric-furnace steelmaking operations at the Johnstown plant after an 11-month shutdown. Operations at the plant were restructured and, along with the company's remaining Lackawanna, NY, facilities, will be responsible for production of carbon and alloy bars. At yearend, after the reorganization, about 2,100 of 5,300 employees at the Johnstown plant were working.

Late in the year, Bethlehem Steel completed installation of an $85 million continuous bloom caster at its Steelton plant. Blooms from the caster primarily will be rolled into railroad rails and also be used for reinforcing bars and other bar products. The plant has a capacity of 1.3 million tons of steel annually. At yearend, about 2,700 of 3,200 employees at the plant were working.

At the firm's Bethlehem plant, an $80 million modernization plan to improve a 48-inch rolling mill and 40-year-old electric furnaces was under consideration. A new $15 million ingot stripping facility was expected to be operational in the spring of 1984. About 80% of the plant's products are structural shapes used primarily by the construction industry. Average employment at the plant in 1983 was about 6,700 with about 2,100 on layoff; 10 years earlier, about 14,700 workers were employed at the plant.

Also during the year, Bethlehem Steel developed a refractory wear monitoring system designed to determine the rate of

furnace lining wear. The monitoring system, consisting of a single-wire coaxial cable containing crushed refractory material between the outer sheath and the inner wire, is imbedded in the furnace brickwork during relining.

In September, Jones & Laughlin Steel Corp. (J&L), a subsidiary of LTV Corp. and Republic Steel Corp., the Nation's third and fourth largest steelmakers, announced plans to merge. At yearend, the agreement remained subject to shareholder and U.S. Department of Justice approval. J&L's operations in Pennsylvania include plants at Pittsburgh, Aliquippa, and Midland with a total work force of 10,500, of which about 4,800 were on layoff at yearend. Republic's only Pennsylvania facility is its Union Drawn Div. cold finished bar plant in Beaver Falls, which employs about 225 workers. Industry analysts predicted that if the merger is completed, some operations would be consolidated.

Earlier in the year, J&L purchased the Midland plant from Colt Industries Inc. for a $35 million note and assumption of certain liabilities. The plant acquisition included two electric furnaces, an argon-oxygen decarburization finishing vessel, a continuous caster used in stainless steel production, and a finishing mill.[8]

Other activities in Pennsylvania's steel industry in 1983 included Sharon Steel Corp.'s $25 million modernization involving desulfurization equipment for the plant's electric furnace, hot metal mill, and improvements to blast furnaces. In June, Wheeling-Pittsburgh Steel Corp. began operating a continuous bloom caster at its Monessen plant. The facility, designed for an annual capacity of 840,000 tons, supplied blooms for the Monessen plant, blooms and forging-quality billets for the commercial market, and billets for production of seamless tubular products at the firm's other Pennsylvania plant in Allenport. Phoenix Steel Corp. permanently shut down its open-hearth furnace in Phoenixville, which had been idle since August of 1982. Steel ingot for tube and pipe manufacturing facilities at Phoenixville will be supplied by the company's Claymont, DE, plant. At one time, the company employed 450, all of which were on layoff when the closing was announced.

Titanium.—A. Johnson & Co. Inc., a division of Axel Johnson Group of Stockholm, Sweden, began the first commercial production of cast titanium slab in the United States at its electron beam furnace facility at Morgantown. The firm also produced ferrotitanium at its Lionville operations.

Zinc.—The State's last underground metal mine was closed in October. Gulf + Western closed the underground zinc mine and surface plant at Friedensville in the eastern part of the State, citing high production costs and a decline in demand. The underground zinc mine began production in 1958 and at onetime produced as much as 4,000 short tons of zinc per month. In 1966, the operations were sold to Gulf + Western and operated under the name of New Jersey Zinc. Gulf + Western officials stopped pumping water from the underground mine at Friedensville upon closure, although substantial reserves reportedly remain. It is reported that the entire property has been sold to a private developer. In 1983, about 16,800 tons of zinc was produced compared with 24,800 tons in 1982.

St. Joe Resources Co., a unit of Fluor Corp., completed a $5 million expansion project at its Monaca zinc smelter, increasing capacity by 15,000 to 100,000 tons per year. According to a St. Joe official, the smelter will never return to the 225,000-ton-per-year production capacity of the late 1970's primarily because most of the zinc consumed in the United States is imported.

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[1]State Liaison Officer, Bureau of Mines, Pittsburgh, PA.

[2]State geologist, Pennsylvania Bureau of Topographic and Geologic Survey, Department of Environmental Resources, Harrisburg, PA.

[3]Economic geologist, Pennsylvania Bureau of Topographic and Geologic Survey, Department of Environmental Resources, Harrisburg, PA.

[4]Pennsylvania Business Survey. V. 25, No. 2, Feb. 1984, 16 pp.

[5]Additional information may be obtained from Pennsylvania Bureau of Topographic and Geologic Survey, Department of Environmental Resources, P.O. Box 2357, Harrisburg, PA 17120, telephone 717-787-2169.

[6]Schenck, G. H. K. Handbook of State and Local Taxation of Solid Materials. The Pennsylvania State University, 221 Walker Building, University Park, PA 16802, 1984, 130 pp.

[7]Work cited in footnote 4.

[8]LTV Corp. 1983 Annual Report. P. 43.

Table 10.—Principal producers

Commodity and company	Address	Type of activity	County
Abrasives:			
Durasteel Abrasives Co	2601 Smallman St. Pittsburgh, PA 15222	Plant	Westmoreland.
Ervin Industries Inc	Box 1168 Ann Arbor, MI 48106	do	Butler.
Satellite Alloy Corp	Satellite Industrial Park Box 171 Springdale, PA 15144	do	Allegheny.
Cement:			
Hercules Cement Co	Center St. Stockertown, PA 18083	do	Northampton.
Lone Star Industries Inc	Wood and Prospect St. Box 270 Nazareth, PA 18064	do	Do.
National Gypsum Co	501 Hokes Mill Rd. York, PA 17404	do	Berks.
Société des Ciments Français	Tour Générale, Quartier Villon Cédex 22 192088 Paris, La Defense France	Plants	Lehigh and Northampton.
Clays:			
Glen-Gery Corp	Box 1542 Reading, PA 19603	Pits	Adams, Berks, Northumberland, Union, York.
Hanley Brick Inc	Box 376 Bradford, PA 16701	Pit	Jefferson.
Harbison-Walker Refractories Co	2 Gateway Center Pittsburgh, PA 15222	Pit	Somerset.
Graphite (manufactured):			
Airco Speer Carbon Co	800 Theresia St. St. Marys, PA 15857	Plant	Elk.
Keystone Carbon Co	1935 State St. St. Marys, PA 15857	do	Elk.
The Stackpole Corp	St. Marys, PA 15857	do	Elk.
Iron oxide pigments:			
Pfizer Inc., Minerals, Pigments, & Metals Div.	640 North 13th St. Box 548 Easton, PA 18042	do	Northampton.
Prince Manufacturing Co	700 Lehigh St. Bowmanstown, PA 18030	do	Carbon.
Reichard-Coulston Inc	15 East 26th St. New York, NY 10010	do	Northampton.
Lime:			
Bethlehem Steel Corp.[1 2]	Martin Tower Bethlehem, PA 18016	Plants	Adams and Lebanon.
Marblehead Lime Co	300 West Washington St. Chicago, IL 60606	Plant	Centre.
Mercer Lime & Stone Co	525 William Penn Dr. Pittsburgh, PA 15219	do	Butler.
Warner Co	Yellow Springs Rd. Devault, PA 19432	do	Centre.
Peat:			
Corry Peat Products Co	515 Turnpike Rd. Corry, PA 16407	Bog	Erie.
Gouldsboro Wayne Peat Co	Box 68 Gouldsboro, PA 18424	Bog	Lackawanna.
Lake Benton Peat Moss	622 South Blakely St. Dunmore, PA 18512	Bog	Do.
Perlite (expanded):			
Allied Block Chemical Co., Therm-O-Rock Div.	Pine St. New Eagle, PA 15067	Plant	Washington.
Pennsylvania Perlite Corp	Box 2002 Lehigh Valley, PA 18001	Plants	Lehigh and York.
Perlite Manufacturing Co	Box 478 Carnegie, PA 15106	Plant	Allegheny.
World Industries Inc	Lancaster, PA 17603	do	Lancaster.
Sand and gravel:			
Construction:			
Davison Sand & Gravel Co	3d Ave. and 4th St. New Kensington, PA 15068	Dredges	Armstrong and Westmoreland.
Dravo Corp	4800 Grand Ave. Pittsburgh, PA 15222	do	Allegheny and Beaver.
Erie Sand Steamship Co	Box 153 Erie, PA 16512	Dredge	Erie.
Shippingport Sand & Gravel Co	355 5th Ave. Pittsburgh, PA 15222	Pit	Beaver.
Warner Co.[1 2 3]	699 Briston Pike Morrisville, PA 19067	Pit	Bucks.
Industrial:			
McCrady Inc	Box 11566 Pittsburgh, PA 15238	Pits	Allegheny.
Pennsylvania Glass Sand Corp	Box 187 Berkeley Springs, WV 25411	do	Huntingdon.

See footnotes at end of table.

Table 10.—Principal producers —Continued

Commodity and company	Address	Type of activity	County
Slag, iron and steel:			
Dunbar Slag Co	Box 666 Sharon, PA 16146	Plant	Mercer.
Standard Slag Co	1200 Stambaugh Bldg. Youngstown, PA 44503	do	Cambria.
Stone:			
Crushed:			
Koppers Co	Box 231 Easton, PA 18042	Quarries	Berks, Bucks, Chester, Clinton, Columbia, Dauphin, Delaware, Lancaster, Luzerne, Montour, Tioga.
New Enterprise Stone & Lime Co. Inc	R.D. 3 New Enterprise, PA 16664	do	Adams, Bedford, Blair, Cumberland, Franklin, Huntingdon, Lancaster, Somerset.
Stabler Co. Inc., Eastern Industries Inc.	Box 3188 Wescosville, PA 18106	do	Berks, Lehigh, Monroe, Northampton, Susquehanna.
Warner Co	R.D. 3, Box 222H Bellefonte, PA 16823	do	Centre, Chester, Huntingdon, Westmoreland.
Dimension:			
H. Dally & Sons Inc	Railroad Ave., Box 27 Pen Argyl, PA 18072	do	Northampton.
Delaware Quarries	Route 32 Lumberville, PA 18933	Quarry	Bucks.
Media Quarry Co	131 East 2d St. Media, PA 19063	do	Delaware.
Sulfur (recovered):			
Atlantic Richfield Co	3144 Passyunk Ave. Philadelphia, PA 19145	Plant	Philadelphia.
Gulf Oil Corp	Box 7408 Philadelphia, PA 19101	do	Do.
Vermiculite (exfoliated):			
W. R. Grace & Co	62 Whittemore Ave. Cambridge, MA 02140	do	Lawrence.

[1]Also stone.
[2]Also slag.
[3]Also lime.